

## 1.1 Purpose and Scope

The Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, conducted the second phase of its investigation of the Paducah Gaseous Diffusion Plant (PGDP or Plant) from October through December 1999. The purposes of the second phase of the investigation, and the subject of this report, were to determine whether environment, safety, and health (ES&H) activities and practices from 1952 to 1990 were consistent with the knowledge, standards, and local requirements applicable at the time and to identify any ES&H concerns that had not previously been documented. The first phase of this investigation, conducted from August through October 1999, addressed DOE and site contractor activities and ES&H issues arising since 1990.

This investigation was performed at the direction of the Secretary of Energy, who instructed the Office of Environment, Safety and Health to examine recent employee concerns about past operations and work practices, and current management of legacy materials (i.e., materials remaining from past operations) at PGDP. Both phases of this investigation were coordinated with other organizations that have regulatory authority at PGDP, including the Commonwealth of Kentucky, the Nuclear Regulatory Commission (NRC), the Environmental Protection Agency (EPA), and the Occupational Safety and Health Administration (OSHA). Excluded from this investigation were any activities currently under NRC jurisdiction (i.e., portions of PGDP leased to the United States Enrichment Corporation, or USEC).

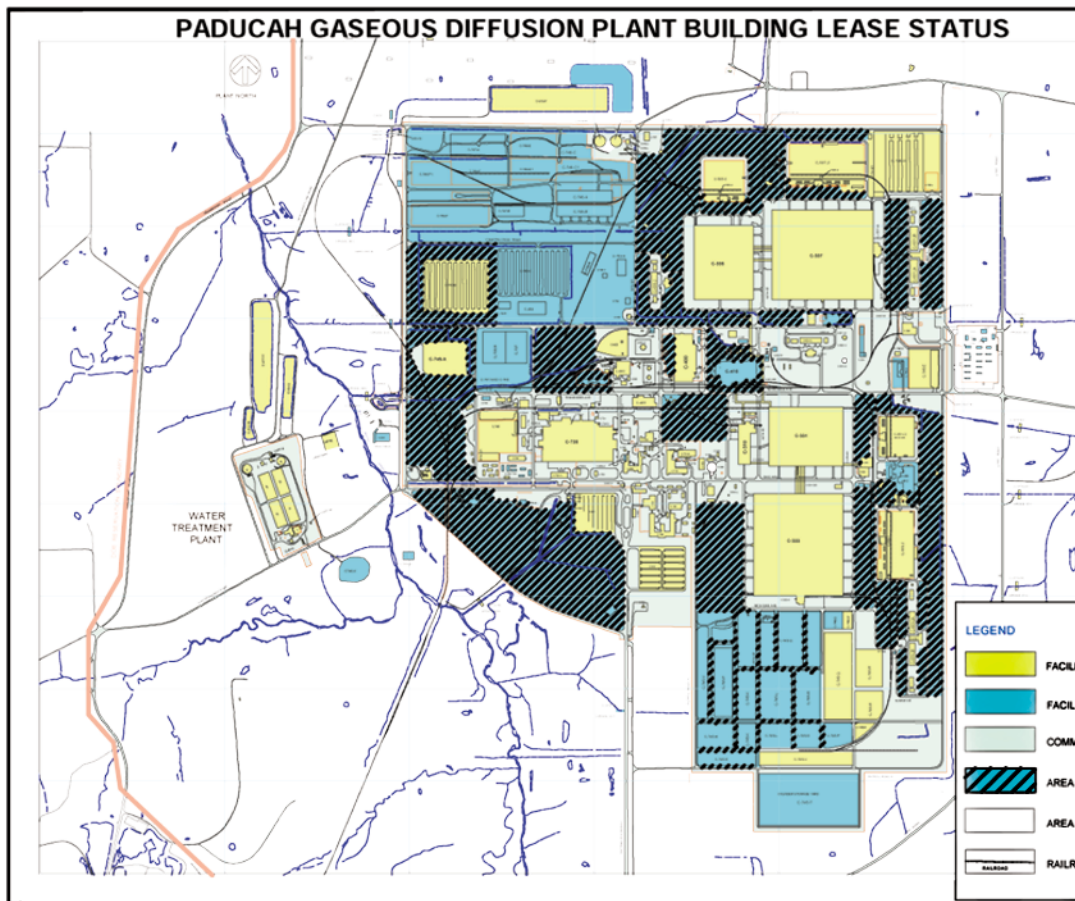
The scope of this second phase includes activities from 1952 to 1990 that affect: (1) DOE- and predecessor agency-owned facilities and properties inside and outside of the security fence, (2) privately- or publicly-owned, non-DOE facilities and properties, (3) DOE and contractor personnel employed at PGDP, and (4) members of the public and the environment in proximity to the Plant. The objectives of this phase of the

investigation are to more fully understand the nature of past operations at the Plant, as well as modifications of operations, processes, and activities; and to identify critical ES&H practices and events that did not, in the judgment of the investigation team, fulfill their mission of protecting workers, the public, or the environment. This phase of the investigation is not intended to be a comprehensive examination of the validity of each ES&H concern or allegation previously expressed or identified and is not intended to conflict or interfere with any ongoing litigation involving ES&H concerns at PGDP. The results of other related evaluations being conducted by DOE—such as the mass balance, exposure assessment, and medical surveillance projects—are also outside the scope of this investigation. Finally, detailed examination of any work that PGDP might have performed for others in relation to weapons systems, as well as the effectiveness of any associated ES&H practices, was not part of the investigation.

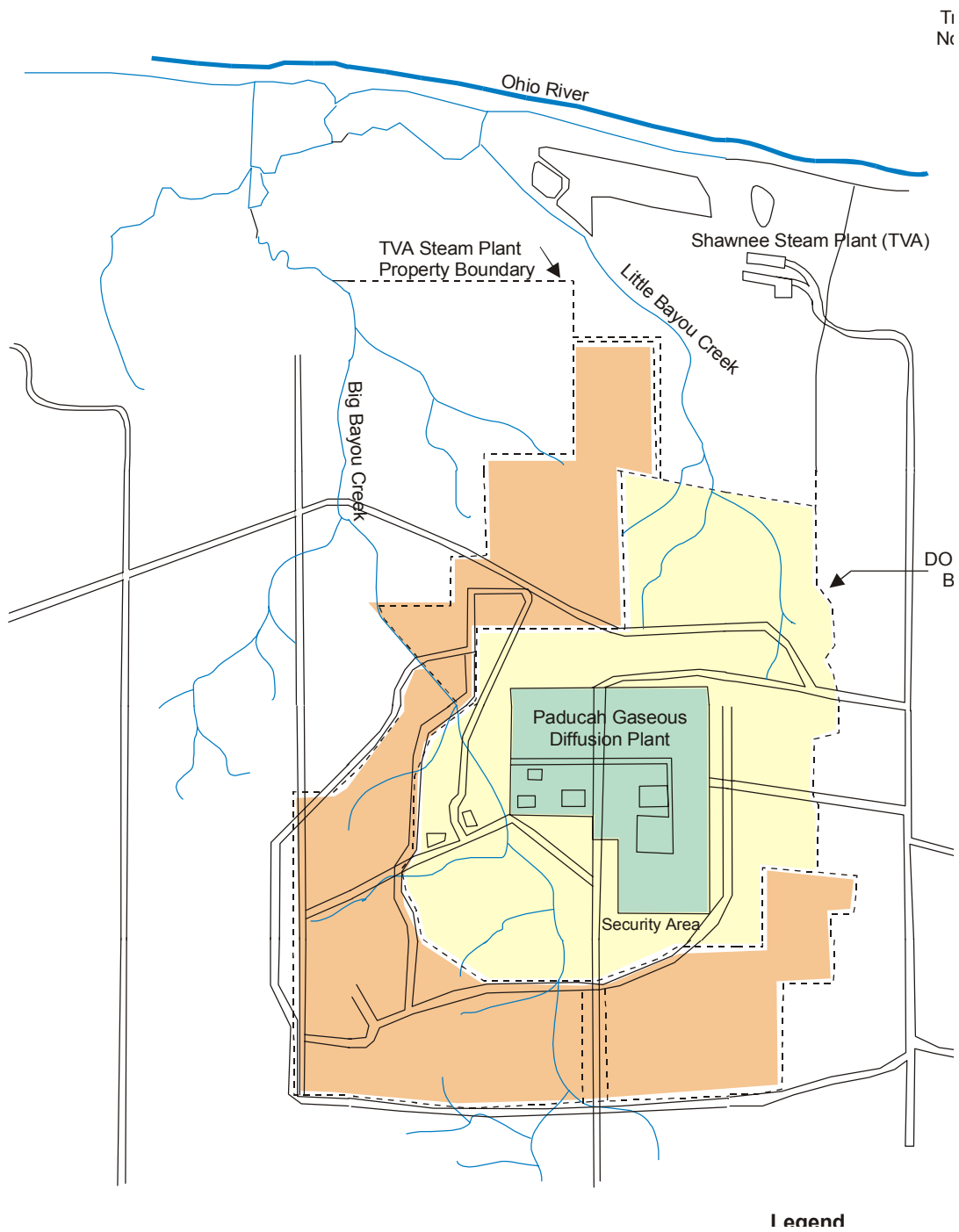
## 1.2 Current Site Operations

The PGDP is located in McCracken County, Kentucky, approximately ten miles west of the City of Paducah and three miles south of the Ohio River. The site occupies about 3,425 acres, 750 of which are within a security fence, and contains uranium enrichment process equipment and support facilities. The mission of the Plant is to “enrich” uranium for use in domestic and foreign commercial power reactors. Enrichment involves increasing the percentage of uranium-235 in the material used for creating reactor fuel ( $UF_6$ ). Uranium-235 is highly fissionable, unlike the more common isotope uranium-238. The PGDP enriches the  $UF_6$  from roughly 0.7 percent uranium-235 to about 2.75 percent uranium-235. Figures 1 and 2 are site maps showing current operations, facility leasing status, and major boundaries.

DOE is the site “landlord,” owns the physical plant, and is responsible for operation of the Northwest plume and the Northeast plume pump and treat systems; for operation of a permitted



**Figure 1. Map of Paducah Gaseous Diffusion Plant, Leased and Non-Leased Areas**



**Figure 2. Map of Paducah Gaseous Diffusion Plant, Major Boundaries and Features**

solid waste landfill; for operation of waste treatment and storage facilities; for waste characterization and disposal; for maintenance of non-leased roads, grounds, and facilities; for surveillance and maintenance of  $UF_6$  cylinders; for construction of new cylinder yards; for maintenance of closed landfills and burial sites; for environmental monitoring; and for environmental restoration. Bechtel Jacobs is the management and integrating contractor for DOE, having been awarded this contract in April 1998. Bechtel Jacobs relies on subcontractors to conduct environmental restoration and waste management functions.

USEC leased the enrichment production facilities on July 1, 1993, and contracted with Lockheed Martin Utility Services as the operating and maintenance contractor until May 1999, when USEC assumed direct operation of the enrichment activities. The NRC performs regulatory oversight of USEC activities. The Occupational Safety and Health Administration regulates USEC occupational worker safety and health, and the Commonwealth of Kentucky and the EPA regulate USEC environmental activities. USEC-leased facilities consist of process buildings, electrical switchyards, a steam plant, a water treatment facility, a chemical cleaning and decontamination facility, and maintenance and laboratory facilities. Over its operating lifetime, PGDP has processed more than 1,000,000 tons of uranium. The process of enriching uranium at PGDP involves heating  $UF_6$  into a gas, which is in turn fed through a series of diffusion stages; PGDP has over 1,800 diffusion stages. The diffusion process generates enriched uranium product and tails. The product (or slightly enriched material) is shipped to the Portsmouth Gaseous Diffusion Plant in Ohio, where it is normally enriched to 3 to 5 percent uranium-235. The tails, typically containing less than 0.5 percent uranium-235, remain on site in cylinders.

## 1.3 Investigative Approach

To support the overall objective of determining whether ES&H activities and practices that existed from 1952 to 1990 were consistent with the knowledge, standards, and local requirements applicable at the time, the Office of Oversight investigation team interviewed current and former site personnel, reviewed documents, walked down high hazard areas of the Plant, and conducted surveys of selected items of potentially contaminated equipment, materials, and waste storage areas.

The Oversight team conducted more than 200 interviews with current and former site employees, including Oak Ridge Operations Office (OR) and Paducah Site Office (PSO) personnel; USEC, Bechtel Jacobs, and previous contractor and subcontractor managers, supervisors, and workers; and stakeholders. Many of these interviews resulted from a solicitation that the investigation team placed in local newspapers requesting information on past (1952-1990) Plant operations, ES&H practices, and specific events that could have affected worker and public safety and environmental protection. These interviews also provided the investigation team with a preliminary indication of the degree to which ES&H practices and controls were consistent with and appropriate to the standards of the day throughout the Plant. This information allowed the team to identify certain ES&H practices for more detailed document and literature review.

The investigation team reviewed thousands of historical documents, including plans, procedures, operations logs, assessments, analyses, and memoranda. These reviews supplemented the information from interviews and clarified the chronology of events at PGDP. The team also examined documents addressing past standards to provide a framework for understanding ES&H requirements and expectations prior to 1990. Many records were obtained from PGDP archives documenting past releases of radioactive and hazardous materials and their potential impacts on workers, the public, and the environment.

To supplement the interview and document

### ***GASEOUS DIFFUSION STAGE***

